TROPICAL AGRICULTURE

THE OFFICIAL JOURNAL OF THE
IMPERIAL COLLEGE OF TROPICAL AGRICULTURE

VOL. II No. 6. TRINIDAD, JUNE, 1925. PRICE 6d.

CONTENTS.

	PAGE.
West Africa	117
The Oil-Palm Industry	119
Sugar-Cane Trash as Manure	121
Sugar-Cane Experiments II	122
Cotton in Nigeria	124
Scientific Officers	125
Cotton Notes	126
Agricultural Notes	127
Tropical World	128
Tanganyika	131
Mycological Notes	132
Advertising Cocoa	134
Environment and Quality	134
Mr. Robert Harvey	136
Chemical Notes	136
Book Reviews	137
College News	139
Trend of the Markets	140
The World's Rice Crop	140

TROPICAL AGRICULTURE is published at the Imperial College of Tropical Agriculture, St. Augustine, Trinidad, West Indies, at the end of the third week of the month preceding the one of issue. Advertisement rates can be obtained at the College from the Editor, or from the Secretary of the College, 14, Trinity Square, London, E.C., England. The Editor will be glad to consider authoritative articles for publication. It is understood that opinions expressed in signed articles are those of the author and do not necessarily represent the policy or opinion of the College Authorities. Correspondence, which will be replied to, is invited on all matters pertaining to tropical agriculture, science and development.

WEST AFRICA.

THE recent visit of His Royal Highness the Prince of Wales to British West Africa will be viewed with satisfaction by all, with the exception of a few disgruntled and irresponsible politicians. Though not the first visit of a member of the Royal family to British territories in Western Equatorial Africa, this is the first occasion on which an Heir to the Throne has done so. There can be no doubt that the long series of exhausting tours which the Prince has voluntarily undertaken will endear him to British subjects in every part of the Empire and give him that sympathy which is acquired only as a result of personal contact with, and understanding of, the problems, hopes and aspirations of our Colonies.

The tour will bring to West Africa a publicity long overdue, for these possessions have long laboured under the opprobrious term, indiscriminately applied, of "the White Man's Grave," a term which, as we have previously pointed out in these pages, is becoming an anachronism, owing to the progress of modern tropical medicine and sanitation. True, these colonies have occasionally flashed into the limelight, but usually as the result of some sanguinary skirmish to which a wide flung Empire such as ours is always subject. To-day they rank not as irritating obligations but as sources of valuable raw materials. A generation ago their commercial value was insignificant, but since then they have risen to dominate the world's markets in several essential commodities. This rapid development is due in no small measure to the skill of the administrators who have guided the destinies of the Colonies. It may be that the system under which they have laboured has become antiquated and cumbersome in the light of modern economic organisation, but it must be admitted that the guiding principle underlying the Government of these areas was framed with the highest motives, and with a due sense of the responsibility of Great Britain as the trustee of the welfare of her primitive subjects. The friction which the system has engendered should in no wise detract from the remarkable achievements of the last twenty-five years; indeed it is the success of these able administrators under the existing system which has made it appear advisable to amend the system in certain directions in order that additional progress may be rapidly realised.

The first part of British West Africa which His Highness visited on his present tour was the Gambia, the oldest and smallest of our possessions in this part of West Africa. The trade of this Colony is confined almost exclusively to groundnuts, the production of which is by no means unimportant, particularly in view of the world's increasing demand for edible vegetable oils for the manufacture of margarine, cattle food, &c.

The importance of the trade may be gauged from the fact that in 1924 four European countries alone, the United Kingdom, France, Germany and Holland, imported no less than 770,000 tons of groundnuts. The Gambia's export consisted of nearly 70,000 tons of which total, it should be noted, a considerable proportion was due to the influx of "strange farmers" from French Senegal who work the land in conjunction with the native

proprietors on a share basis. The outlet provided by the railway from French Sudan to the coast is expected to result in a decrease in these immigrants who will find it more profitable to grow nuts in their own territory. It remains to be seen whether, with improved methods, the Gambia's small population of 200,000 can maintain this volume of trade. The development of the Colony was hindered by the war and by the world wide depression in trade which followed, and consequently the main efforts of its Governor, His Excellency Capt. C. H. Armitage, C.M.G., D.S.O., have been directed towards a husbanding of resources in order to balance the annual budget, but the establishment of the staple industry of this country is a matter which redounds to the credit of all concerned.

The prosperity of Sierra Leone rests, in the main, upon the palm kernel of which 61,117 tons, valued at £1,096,386 were exported in 1924, constituting 70 per cent. of the total value of exports.

It is to be regretted that the native neither cultivates nor tends the trees upon which his livelihood depends and, furthermore, his methods of extracting the oil are both crude and wasteful. The Government is fully alive to this undesirable state of affairs and is conducting experiments upon plantation lines to discover the most profitable varieties for cultivation. Minor crops such as kola nuts, cocoa, rice, cotton, ginger and chillies are being developed and are adding to the agricultural wealth of the country. Under its able Governor, Sir. Alexander Slater, K.C.M.G., who has seen considerable service in the East and in the Gold Coast, rapid progress upon sound lines may be expected. Freetown, the magnificent harbour of the Colony, sprang into prominence during the war as a clearing house for convoys on their way to England through the infested submarine area, but with a rapid development of the hinterland its prosperity will be based upon a more stable basis as the outlet for the products of a rich agricultural country.

The spectacular development of the Gold Coast is due in large measure to the careful policy pursued by its Governors during the earlier years of its history as a British possession, a policy which secured for it a financial stability upon which such capable administrators as Sir Hugh Clifford, and its present Governor, Sir Gordon Guggisberg, have built. The growth of the Colony's trade can be best illustrated by reference to the growth of the cocoa industry. In 1891 the Colony exported cocoa to the value of £4; last year no less than 198,000 tons were exported, constituting nearly 50 per cent. of the world's total output. This industry is probably unique in the sense that it is carried on entirely by small peasant proprietors. None will deny that the industry possesses many grievous defects but they detract but little from the remarkable achievement of a mere generation. It is a matter of satisfaction, upon which we have already commented, to note that the authorities are fully alive to these defects and are devoting considerable attention to the introduction of minor but more profitable crops, as well as to an improvement in the staple industry of the Country.

Nigeria, is by far the largest of our West African possessions and comprises an area of 369,000 square miles with a population of 18,500,000. The progress of the country has, in the past, been retarded by a devastating series of epidemic diseases, but medical and sanitary reforms are effecting a gradual improvement. When its rich potentialities are fully developed the country will occupy a highly important position in the world's markets. Much of the recent development of the Colony is due to the work of Sir Frederick Lugard who went out originally as the representative of the Royal Niger Company, and later became the first High Commissioner of the Northern Nigerian Protectorate when this territory was taken over by the Crown. In 1914 Northern and Southern Nigeria were united, thus removing a great barrier to the progress of the united areas. Sir Hugh Clifford, G.C.M.G., the present Governor, who shortly proceeds to Ceylon, introduced other striking administrative reforms, culminating, in 1923, in the inauguration of a reformed Legislative Council with official, representative, and elected members. Within the limits of the existing system the stage is cleared for a comprehensive development of the economic resources of the Colony. While its potential wealth is immense in comparison with its existing trade it must not be imagined that commercial development has lagged behind administrative reforms. In the twenty years following 1900 its export trade had increased ten fold and is now valued at over £10,000,000 per annum, a fact which, in spite of the change of values caused by the war, indicates rapid development. Palm oil and palm kernels constitute 60 per cent. of the total value of all produce exported, but a rapid increase is expected in the production of cocoa, cotton, rubber and groundnuts.

This brief and necessarily superficial review of the Colonies embraced in the tour of His Royal Highness is sufficient to indicate that these territories possess immense potential wealth which, in spite of the great strides already made, has been realised only in a minute degree. It is only right that at the present time those able administrators who have guided the fortunes of these areas should receive the credit which is their due. Whether the system under which they have worked needs revision is a matter which has recently received considerable attention in the Press, and with the revival of interest effected by the British Empire Exhibition and no less by the visit of His Royal Highness, the time appears opportune for a searching investigation particularly into the system of land tenure, upon which the type of development largely depends. Whatever the result of such an investigation might be, one thing at least is certain, namely, that Britain's administrators have performed their arduous duties with that distinction and integrity which the Mother Country demands of her servants throughout the Empire.

THE OIL-PALM INDUSTRY.

With special reference to West Africa.

SIR FREDERICK LUGARD, G.C.M.G., C.B., D.S.O., &C.

[*In this article from the British West African Section of the "Times Trade and Engineering Supplement" Sir F. Lugard reviews the West African Oil-Palm Industry and suggests methods for its development.*]

THE British public, long accustomed to regard West Africa as a land of illimitable potentialities in agricultural and silvan wealth, has of late heard disquieting rumours that the staple export of Nigeria, the largest of the British Dependencies, viz.:—the products of the oil-palm, is threatened by competition from the East, more particularly from the Dutch Colonies.

In the last decade of the nineteenth century large profits were realised by the export of forest-grown rubber, and the annihilation of this industry by the plantations of Ceylon, Malaya, and the Dutch East Indian Colonies has emphasized the reality of the danger which may threaten West Africa from the competition of the East in other products. The export of oil-seeds still remains the most important industry in British West Africa, and of these the products of the oil-palm are by far the most important, though the tree is restricted to the equatorial rain-belt. Nigeria, north of this belt, contributes some 60,000 tons of groundnuts, and these form almost the sole export of the little Colony of the Gambia. In the Gold Coast cocoa has taken the place of the oil-palm, but it still constitutes the wealth of Southern Nigeria and of Sierra Leone.

The magnitude of the trade in palm products may be seen from the figures given in the report of the "Edible Nuts Committee" in 1916, and they have since been considerably increased. Of kernels 234,000 tons, valued at £4,200,000, and of palm oil 89,000 tons, valued at £2,000,000 were exported in addition to 3,800 tons of kernel oil (£130,000). Recent estimates put the output of the whole of West Africa (exclusive of the Congo) at 430,000 tons of kernels and 180,000 tons of oil, valued in all at 12 millions sterling.

West Africa has relied on its hitherto unchallenged monopoly of the oil-palm, and its successful introduction into the Dutch Colonies under the same conditions as those which killed the wild-rubber industry has therefore naturally been watched with some anxiety. The Governor of Nigeria, in his address to the Legislative Council in February, 1924, spoke of it as a serious menace. Up to January, 1923, only 30,000 acres had been planted, and the quantity put on the market is not therefore at present very great, but the climate and soil have been found to be well adapted to its culture. Later information is to the effect that 60,000 acres are planted, of which 15,000 are in bearing. The danger, said the Governor, lies not only in the extension of its cultivation, but in the fact that the yield per tree is greater than in Africa, and a larger amount of oil is extracted by machinery than by African methods. The latter, we are told, average about 35 per cent. to 40 per cent. of soft oil, and 50 per cent. of hard, as compared with at least 90 per cent. by machinery. It is, moreover, of better quality with a smaller percentage of fatty acids.

The conditions under which the industry is carried on in West Africa in contrast with those existing in the East may be briefly described as follows: The oil-palm in West Africa exists entirely in a wild state. Vast areas are covered by millions of palms, to which access through the dense tropical undergrowth is difficult. They generally attain a great height, and skilled climbers are required to cut the fruit bunches. The land, including these belts of palm forest, is recognised as belonging entirely to the native tribes. Any rights acquired by foreigners must be negotiated with the native owners, subject to the covering approval of Government. Only short-term leases are permitted, and on their expiry the plant must be forfeited or removed if the native lessor declines to renew the lease. The fruit is collected by the natives—large quantities remaining ungathered. Part is consumed as an article of diet, and from the remainder oil is prepared by a crude process and sold to merchants for export. Being accumulated in small quantities from day to day in the villages, fresh oil and oil which has become partially rancid are mixed, so that the percentage of free fatty acids, which deduct from its commercial value, is much higher than that of oil prepared by up-to-date methods from fresh fruit.

Palm oil is extracted from the pulp; the kernel contains oil of a better quality, normally nearly double the value. These kernels are cracked by hand by the women and conveyed by head-carriage or canoe, largely through the agency of a middleman, to merchants on the coast for export to the crushers in Europe or America, with a varying quantity of shell and dirt. The population of the districts in which the oil-palm grows is dense, and its industry is proved by the enormous amount of oil and kernels exported, in addition to the local consumption. The quantity of kernels actually exported shows, however, that the export of oil is less than a quarter of what might be recovered from the fruit.

The districts are often infested by tsetse-fly, which, with the absence of fodder-grass, precludes the use of animal transport. The distance of the ports of export from the home markets is short in comparison with those of the Eastern Colonies, and there are no canal dues to be paid.

In the Dutch Colonies, on the other hand, palms raised from the best selected varieties are grown in well-ordered plantations. The trees, spaced at regular intervals, are kept free of undergrowth; the fruit is collected and transported by light rail or mechanical transport to the mills, where it is dealt with while quite fresh. A much

larger proportion of the oil is recovered and the fatty acids are reduced to a minimum. The plantations are under scientific supervision, and an adequate supply of efficient Chinese labour is available. The palms, relieved of the necessity of struggling for light and air with competing vegetation, do not grow to a great height, and the difficulty of climbing and collection is minimized. The estates are already working at a profit, though the trees when in full bearing will yield five times their present output.

In the Belgian Congo Lord Leverhulme has adopted a system intermediate between these two extremes. Concessions of "palmeries" are granted by the state on very stringent terms as regards the wages, housing, and general welfare of the native labour employed, including the provision of schools, hospitals, and medical aid, with food and blankets. The area consists in part of plantations, which are gradually extended, and in part of forests of wild palms, the fruit of which is collected by the natives and sold to the mills at an agreed rate after native food requirements have been satisfied.

Lord Leverhulme has from time to time expressed his desire to start similar enterprises in the British Colonies, and has condemned the attitude of the local British Governments in terms which have led to heated controversy. In his view it is preposterous that vast quantities of valuable food products—for the oil is capable of conversion to edible purposes—and of raw material for commerce should be allowed to run to waste. The native, he maintains, must either be made to work and collect the fruit or allow others to do so. Since the native is incapable of organization, the palm forests should be exploited by European capitalists on scientific lines which would afford adequate security for the capital invested.

The Governor of Nigeria, while dissenting from these views, expresses the emphatic opinion that the only remedy lies in the erection of central factories by European capital without loss of time. Is there no way out of this *impasse* by which the rights of the natives (for whom we have declared before Europe that we are trustees) may be safeguarded in their lands and in the produce of their forests without rendering impossible the fulfilment of our parallel obligation to develop these territories for the general benefit of mankind? The future prosperity of an important dependency, it may be urged, is imperilled by the inability of its primitive inhabitants to understand the conditions of modern world competition, and it is the duty of a trustee to protect his ward from the inevitable results of his own ignorance. The principle has to a large extent already been accepted in the forestry legislation of Nigeria. The problem was referred to a committee at the Colonial Office a year or more ago, but its report has never been made public.

Sir H. Clifford's view, as we have seen, is that "the only remedy lies in the erection of central mills in the important palm-oil areas ... an enterprise which must be dependent on European capital, organization, energy, and management." By such means, he adds, the time now spent by the natives in extracting the oil will be left free for cutting and collecting the fruit, and the quantity thus vastly increased. He assured any firms who were prepared to embark on this enterprise of every assistance from the Government. This, however, leaves untouched the crux of the question raised by Lord Leverhulme, viz.:—what guarantee has the mill-owner that he will be assured of continuous supplies of fresh fruit to feed his mill?

In reply to questions put by myself during the sittings of the "Edible Nuts Committee" in 1916, Mr. Lewis Smart suggested that by free negotiation, and without any compulsion, the mill-owner might acquire from the surrounding native landowners all collecting rights within a certain distance of his mill, exclusive of the quantity required by the people for food. The area enclosed by a circle with a two-mile radius from the mill would, he estimated, be required to assure a supply of 10,000 tons a year, though half that area would suffice when it had been fully developed. Once the negotiations had been carried through it would be necessary for Government to legalize the transaction, in order to protect the mill-owner's rights. He would naturally employ the natives resident in the area to collect the fruit, supplementing the labour supply from outside if necessary. On the expiry of the agreement it may be assumed that he would have acquired the confidence and co-operation of the people and be assured of a renewal of his lease for a reasonable period.

Mr. Tudhope, Director of Agriculture in the Gold Coast, made a similar suggestion at a conference last October. The situation, he thought, could be saved by friendly negotiation between the mill-owner and the natives, so that the latter were assured that co-operation and not exploitation was intended. The objection to Mr. Smart's scheme would seem to be that the natives, having been induced to part with their collecting rights, would become mere wage-earners, while the absence of any contractual obligation in Mr. Tudhope's proposal would hardly provide sufficient security to tempt private enterprise. It will be freely conceded that since the Congo State became a Belgian Colony under King Albert the interests of the natives have been jealously safe-guarded, and it is argued that the system of free collection of the fruit by the natives, with the obligation to sell to the mill-owner at a fair price in return for benefits received, would avoid some of the disadvantages of the other proposals.

There are difficulties in any scheme. The inhabitants of these palm forests are for the most part primitive folk and very suspicious. Many no doubt would oppose any such agreement. In some cases the ownership of the

land is separate from the ownership of the trees. Even if all difficulties were surmounted there would probably be constant attempts to violate the compact and if the enterprise is to succeed—or indeed if anyone is to be tempted to undertake it—Government support in enforcing the agreement must be assured.

That any such arrangement should be entirely voluntary on the part of the natives, in return for substantial benefits, has been assumed as a matter of course in British West Africa. On the other hand the Government cannot lose sight of the fact that the Powers in control of African territories have a duty to develop them for the benefit of mankind at large. Apart from the value of palm-oil in various industries, the hydrogenizing process by which it is converted to edible uses, and the extensive use of margarine among the poorer sections of the population of Europe, have added greatly to the world's demand. If means can be found, without violation of native rights, to increase and cheapen this source of food supply and material for industry, it is clear that no effort should be neglected to achieve so desirable a result. The Government could, of course, materially assist in developing these Empire resources in accordance with the resolution of the Imperial Conference of 1918, as against foreign competition, by extending to palm and kernel oil the preference granted to cocoa and sugar. The far-seeing mill-owner, on his part, may find it possible to secure the whole-hearted co-operation of the natives by some scheme of profit-sharing.

The duties of a trustee—whether to the subject race or to civilization—are not discharged by a policy of *laissez-faire* and of economic waste. It is his function to exercise foresight and to press forward schemes for increasing prosperity or averting disaster which are beyond the vision and experience of primitive peoples.

The objects in view are sufficiently important to bear recapitulation :—

To save a threatened industry in a British Colony by the adoption of methods which will enable it to hold its own against competition, for the market once lost will not be regained.

To preserve for human use the millions of tons of valuable produce now uncollected, or wasted by crude methods of preparation.

To increase output by converting to productive work the labour now wasted in archaic methods of transport and preparation of the oil.

To devote to native welfare a portion of the profits of the capitalist, and possibly by systematic clearing (planting with efwatakala grass*), &c., to decrease the areas subject to tsetse-fly and the diseases (sleeping sickness and cattle disease) of which it is the carrier.

* *Melinis minutiflora*, said to be an excellent fodder and repellent to tsetse-fly (Kew Bulletin 10 of 1922).

SUGAR-CANE TRASH AS MANURE.

PROFESSOR F. HARDY, M.A.

IN the last number of this Journal, an authoritative account of recent advances in our knowledge concerning the natural decomposition of cellulosic plant material was presented. It was stated that the investigations of the Rothamstead workers have demonstrated that the micro-organisms responsible for the break-down of straw, cane trash, and any similar vegetable matter that may be applied to the land, require for their sustenance a certain amount of nitrogen. The initial nitrogen content of straw and the like, is usually not sufficient to supply this need, nor can much aid be expected from atmospheric nitrogen-fixing bacteria which generally accompany the cellulose organisms. Consequently, nitrogenous substance in the form of urea in urine, or in the form of some other suitable compound, such as that which comprises the main ingredient of "Adco" mixture, must be added before a satisfactory cellulosic fermentation can be obtained. If such initial addition be omitted, the micro-organisms *may draw on the nitrogen reserves of the soil*, and this may lead to seriously diminished yields, because the micro-organisms will compete with the crop for nitrate.

There has sprung up amongst sugar-cane planters in some countries a certain disregard of the possible losses that may be incurred by the practice of burning trash off the canes before reaping. In many instances, it has been urged that cane fires are really beneficial, in that they make reaping a much more rapid, cheap, and easy operation (doubtless justifiable in the case of certain sugar-cane varieties, such as Uba), and in that they effect partial sterilization of the surface soil, and serve an even more useful purpose in destroying the spores of fungi and the eggs of injurious insects. Whilst these desirable effects are no doubt frequently attained by trash burning, they should be offset against loss of sucrose in the burnt canes, and destruction of humus in the soil.

An additional reason sometimes put forward in defence of trash burning, is that the extra trouble and expense involved in the stripping and ploughing-in of bulky cane trash apparently is not always repaid by increased crop returns, such as might reasonably be anticipated. As far as the writer is aware, no conclusive experiments based on actual costing, have ever been conducted to test this supposition, but it appears likely that in certain instances, the addition of a large bulk of cane trash to a soil initially poor in nitrogen reserves, might temporarily deplete the soil of nitrate (for reasons already given), and thus reduce the magnitude of the crop.

In support of this opinion, it might be stated that cereal growers in northern countries have found that the practice of ploughing-in fresh straw generally results in a marked depression in the yield of the succeeding crop. In order to

overcome this difficulty, the Rothamstead investigators* have suggested that a leguminous crop should be grown immediately following an application of undecomposed straw. The leguminous crop would, of course, be largely independent of a soil-nitrate supply, because of the activity of its nodule bacteria, and, moreover, its residues would furnish nitrogen in amount amply sufficient to supply the needs of straw-decomposing organisms. A beginning was made at Rothamstead by investigating the action of straw chaff upon the development of root nodules of soya beans growing in pot cultures of soil. A large increase in the number of root nodules was found to occur as a result of the straw addition. In one instance, the number increased from 234 to 636. Nevertheless, the yield of the leguminous crop was not correspondingly increased, because, whilst the straw stimulated the infection of the roots with nodule organisms, it did not cause an increase in root growth, so that the root systems were too small adequately to feed the increased number of nodules. Subsequently, the combined action of straw and phosphate was tested. It is well-known that phosphates stimulate root development, and it was thought that its effect might therefore give, in addition to a greater number of nodules, a considerable increase in crop. These expectations were completely realized in preliminary trials, and it is expected that eventually a new system of manuring will be evolved, by which unrotted straw may be applied to soil, followed by a leguminous crop manured with phosphate, so that the nitrogen losses usually attendant upon the incorporation of cellulosic material into soil may be overcome.

Sugar-cane planters might with advantage note the results of this important work at Rothamstead, for it is gradually being realised, at least in tropical countries that have long been growing the sugar-cane crop, that some sort of rotation must be practised, and greater care taken to conserve or to build up the supply of organic matter in the soil, if serious deterioration in fertility is to be avoided†.

Copies of *Tropical Agriculture* Vol. I, No. 9 and Vol. II, Nos. 1, 2 and 3 are no longer available. A list is being kept of all readers desiring copies of these numbers and is being dealt with in rotation as additional copies are returned. The Editor requests the co-operation of readers possessing spare copies in order that other readers may complete their files.

---

* "Discussion on the action of Bacteria on Cellulosic Materials," *Journ. Soc. Chem. Indus.*, 1923, Vol. XLII, No. 26, remarks by H. G. Thornton, p. 286 T.

† See "Report of a Committee on Agricultural Progress," American Sugar-cane League, 1923 (Louisiana), in *Facts about Sugar*, July 14, 1923, p. 34. Also S. F. Norse, *ibid*, Aug. 11, 1923, p. 131.

SUGAR-CANE EXPERIMENTS.

(*Continued.*)

PROFESSOR J. SYDNEY DASH, B.S.A.

II. Variety Tests.

IT must be understood that our plot work in Agronomy is used as much as possible for teaching purposes—providing material and facilities for the study of variety characteristics, growth habits, &c., or even for the study of special problems such as are assigned to advanced students. At the same time the work is planned so that wherever possible definite investigations can be undertaken, results recorded and conclusions of practical value drawn. In 1923-24, a limited amount of land was available for sugar-cane and a number of the best varieties obtainable locally were established in plots, both spring and fall planting being adopted. This work is therefore not yet old enough nor on a scale large enough, bearing in mind the necessity for adequate multiplication of plots, to enable very definite conclusions to be drawn. On the other hand, one or two points of interest have emerged; there is evidence, for example, in the spring planted plots that may allow a tentative value to be placed on a certain variety as being useful for late crop planting, at any rate under the soil and climatic conditions of the district in which the College is situated.

The soil of this field is very similar in type to that of the field in which the cultivation experiments described in the last number of this Journal (Vol. 2, No. 5, p. 95) had been carried out—a light to medium silty loam, which works easily when sufficiently moist, but as the particles are very fine there is a tendency to pack and become very hard when dry. It therefore will require to be liberally fed with organic matter. Being savannah land when taken up, the grass roots had first to be exposed; animals for ploughing not being available, it was hand forked and turned over at the beginning of the rainy season, afterwards ridged and furrowed. In July, Bengal beans were planted on the ridges as a cover crop, which in October was pulled off and placed in the furrows, farm manure at the rate of ten tons per acre being applied on this material and the banks broken to cover it. The fall planted cuttings were inserted in the drills, which now occupied the space of the original banks, during early November, 1923; distance of planting 5 feet between the rows and 4 feet in the rows. Four varieties, occupying one-eleventh of an acre each, were used—B.H. 10 (12), Ba. 6032, H. ? and Badilla. H. ? is a seedling from Hawaii, the number of which appears to have been lost. Little trouble was experienced with weeds on account of the heavy smother provided by the Bengal bean crop, and as soon as the canes had made sufficient growth the banks were cultivated and soil thrown to the stools to gradually level up the drills. In the case of the spring planted plots, the procedure had to be

somewhat different. Instead of turning in the Bengal beans, they were pulled off and used on a compost heap ; this part of the field was then planted in November, 1923, in sweet potato plots after the banks had been lightly forked. The potatoes were dug towards the end of March, 1924, the drills forked and farm manure applied at the rate of ten tons per acre, the old banks being broken to cover it thus making fresh drills in which the cuttings (obtained from a nursery) were inserted during the middle of May. Cultivation thereafter was the same as for the previously mentioned plots, soil from the banks being gradually thrown to the stools to level up the drills. The varieties, which occupied one-twenty-third of an acre each, were as follows :— Ba. 11,569, B. H. 10 (12), B. 156, Ba. 6,032, T. 718, White Tanna, Uba. Both lots of plots were harvested during the first week of March, 1925. The total rainfall during the time (sixteen months) the fall planted canes occupied the land was 88 inches and the spring planted (nine and a half months), 67·29 inches.

Results are recorded in Table III. To give the figures as practical a value as possible, an effort has been made, in co-operation with the Department of Sugar Technology, to calculate the results in terms of 96° sugar per acre. In this connection Professor Boyd, who has been comparing closely laboratory and factory returns, comments as follows :—"I have assumed a normal juice extraction of 80 per cent. and have worked the tons of available sugar by Winter's formula

$$\left\{ \left(1{\cdot}4 - \frac{40}{\text{purity}} \right) \times \text{indicated sucrose} \right\}$$

dividing that result by 96 to bring it to commercial raws. I have deducted 6 per cent. from the small mill purity and worked out the sucrose thus."

TABLE III. A.—FALL PLANTED.

Variety.	Cane Yield per acre tons.	Brix.	Sucrose in Juice per cent.	Purity.	Glucose in Juice per cent.	Glucose ratio.	Normal Juice per acre tons.	Sucrose in normal Juice per acre tons.	Available Sucrose per acre tons.	Sugar (96°) per acre tons.
B.H. 10 (12)..	49·62	20·72	17·63	85·07	2·13	11·28	39·70	7·00	6·50	6·78
Ba. 6,032 ..	71·51	15·30	12·49	81·64	2·09	15·58	57·21	7·14	6·50	6·78
H. ? ..	44·30	19·55	16·42	83·97	—	—	35·44	5·82	5·38	5·60
Badilla ..	41·32	18·55	13·66	73·30	1·79	13·19	33·06	4·52	3·86	4·02
B.—SPRING PLANTED.										
Ba. 11,569 ..	34·86	20·42	17·03	83·40	1·06	5·85	27·89	4·75	4·37	4·55
B.H. 10 (12)..	31·55	20·15	16·40	81·39	1·41	8·00	25·24	4·14	3·76	3·92
B. 156 ..	35·04	17·66	14·44	81·76	1·26	8·12	28·03	4·05	3·68	3·83
Ba. 6,032 ..	31·50	18·15	14·44	79·56	1·58	10·17	25·20	3·64	3·26	3·39
T. 718 ..	25·70	18·28	15·30	83·71	1·20	7·31	20·56	3·15	2·90	3·02
White Tanna	34·51	16·72	12·18	72·82	2·16	16·30	27·61	3·36	2·86	2·98
Uba ..	29·17	18·42	13·48	72·9	1·71	11·70	23·34	3·15	2·68	2·80

It will be observed from part A. of the table that both B.H. 10 (12) and Ba. 6,032 have in this case given the same amount of sugar per acre although the field return of the latter was remarkably superior. This serves to emphasize the fact that extreme heavy tonnages in the field are often accompanied by relatively inferior juices and that in practice a variety with high sucrose starts with a big advantage. This is sometimes not sufficiently realized by field men who are naturally more interested in high cane yield per acre, especially where a bonus is paid on field returns only. As pointed out, however, in a previous article (*Tropical Agriculture*, Vol. 2 No. 4, p. 73), there is room for considerable economic research on the strictly commercial value of cane varieties, involving careful cost accounting at every stage in production. The H.?

proved to be better than Badilla as a yielder in these trials, but the latter is an interesting variety in that it is the principal cane grown in Queensland, is also cultivated in Fiji and is reported to be resistant to both mosaic and Fiji diseases. It appears to have been introduced into Australia among a lot of New Guinea canes in the early nineties and is said to have proved a godsend to the Commonwealth. In our plots this variety was found to be affected with mosaic to the extent of 1½ per cent. It may be described as a dark purple to black cane, stout, with white waxy rings at the nodes, internodes 2 to 3 inches long (ratoons a little more) with large and prominent eyes, habit erect, with heavy upstanding top. It produces numerous tillers in the early stages of growth and with its dense foliage, soon covers the ground thereby assisting in weed control.

In the spring planted varieties (Table III B.), the leading place is taken by Ba. 11,569, followed by B. H. 10 (12). The results from the first four plots may be considered very satisfactory, considering that they occupied the land only a little over nine months. From general observations made on Ba. 11,569 it seems to be adapted to spring planting under Trinidad conditions, especially as it arrows very freely when planted in the early fall months. The quality of its juice in these plots is somewhat better than that of B. H. 10 (12).

As regards the prevalence of pests and diseases, the plots on the whole were healthy. There was little moth-borer and mealy bug and only very slight traces of root disease. Mosaic showed up in Badilla to the extent of 1·5 per cent. as already mentioned; in B. 156, approximately 1 per cent.; in Ba. 11,569, 3 per cent.

Several other varieties are under observation, some like Bourbon and White Transparent, largely for demonstration purposes. In addition, a number of seedlings were raised at the end of 1924 and transferred to the field about a month ago; in this way, material will be available for use with classes in connection with work of this kind, and at the same time will allow of investigations being made concerning some of the points raised in the article dealing with certain considerations on the subject of testing cane varieties which appeared in Vol. 2 No. 4 of this Journal. We have also found what appears to be an "eyeless" strain of D. 109; an effort is being made to fix this type by growing it from top plants only. This, of course, will be of no value commercially, but may point the way to improvement, by selection, of varieties possessing very prominent eyes, which are frequently associated with poor milling qualities.

The Editor requests that any subscriber who fails to receive *Tropical Agriculture* regularly should communicate with him immediately in order that the matter may be rectified.

COTTON IN NIGERIA.

C. J. LEWIN.

Deputy Director of Agriculture.

THE dry season draws to its close in March. The harmattan, an intensely dry dust laden wind from the Sahara, is abating in Northern and has ceased in Southern Nigeria. The rains are ushered in by a series of violent tornadoes, the commencement of which is expected daily. Throughout the country, from January onward the native farmer burns off the bush from the land he intends to cultivate during the coming season. Abundance of land permits the universal adoption of a system of shifting cultivation, and the waste of fertility caused by burning bush is hardly a factor which can be considered in Nigerian Agriculture. It is remarkable that the wild oil palm survives these annual and somewhat indiscriminate conflagrations.

Cotton.—At this time of the year extension work in connection with cotton markets forms a large part of the activities of the Department of Agriculture. The marketing season extends from December till June, but the bulk of the crop is sold by the end of March, unless an anticipated rise in prices holds it up. All cotton sold for export is graded under the supervision of the Department of Agriculture. The current prices per lb. of seed cotton at buying stations on the Railway are as follows :—

	American.	*Native.*
Grade I.	.... 3d.	2¼d.
Grade II.	.... 2¾d.	2d.
Grade III.	.... 2¼d.	1½d.

Northern Nigeria is the source of almost the entire export of American Cotton, which is exclusively Allen's Long Staple. In areas in which American Cotton culture has become established the growing of Native Cotton is prohibited. The official estimate of the probable export of American Cotton, formulated before the picking season started, was 21,000 bales (of 400 lb. lint) as compared with 15,000 bales actually exported last year; and the purchases during the first half of the season indicate that the estimate will prove an accurate one.

In Southern Nigeria on the other hand, repeated attempts to introduce exotic cottons have failed. A comprehensive series of investigations as to the cause of this failure was commenced last year and is still proceeding. In the Southern Provinces there is a long established local cotton industry and only the surplus of the crop is offered for export. It is difficult to estimate this export surplus. Last year it was about 7,000 bales and it is anticipated that it will be approximately the same this year.

The Native Cotton exported which is chiefly of the *Gossipium peruvianum* type is short (⅞ in.-1 in. staple) and coarse. Bad picking and the prevalence of insect pests lower still further the market value of the lint, but it is hoped that the newly established system of grading will cause some improvement in the near future.

SCIENTIFIC OFFICERS.

With special reference to Tropical Agriculture.

[*The following article commenting on a speech by the Parliamentary Under-Secretary of State for the Colonies, is reproduced from "Nature" March 28, 1925, p. 449. It briefly reviews the history of tropical departments of agriculture, and urges the more extensive employment of scientifically trained men in British tropical colonies.*]

MR. ORMSBY-GORE, Parliamentary Under-Secretary of State for the Colonies, speaking at the annual dinner of the National Union of Scientific Workers on March 19, emphasized the need for many more highly trained scientific officers in British colonial possessions. His recent visit to East Africa with Major Church, secretary of the Union, as members of the East African Parliamentary Commission, revealed to him some of the problems which could be solved only by the use of scientific knowledge, and developments which can come from scientific guidance alone. He regarded the present position as to officers and institutions concerned with tropical agriculture as "a disgrace to the Empire."

The earliest appointments of this class of scientific officers in tropical agriculture were the heads of the various tropical botanic gardens, usually systematic botanists, whose concern with agriculture was only a limited one, their principal duties being the introduction of possible useful plants, and the investigation of the local flora. The first officer of a more specialist type to be appointed in the British tropical colonies was the late Prof. Marshall Ward, who was sent to Ceylon in 1882 to investigate the coffee leaf disease (*Hemileia vastatrix*) and to endeavour to find some remedy for the already desperate position of affairs. But his advent upon the scene was much too late for any remedy to be applicable that was within the means of the planters, and the visit was unsuccessful, so that public opinion was set against such appointments. A little later, however, the well-known Dr. Treub obtained quite a considerable staff of specialist scientific officers at the great Dutch colonial institute in Java, to which Mr. Ormsby-Gore paid high tribute.

For a long time no further appointments were made in the British tropical colonies, and the next, so far as we are aware, was that of Mr. E. E. Green (now president of the Entomological Society), who in 1897 was made honorary government entomologist in Ceylon, with a small grant for expenses. In the following year, Mr. J. Parkin was appointed assistant in Ceylon to investigate the chemistry and physiology of the coagulation of rubber latex. Mr. Green did such valuable work in his honorary capacity that in 1899 he was appointed full-time entomologist, while in the same year the newly formed Imperial Department of Agriculture in the West Indies appointed Mr. Maxwell Lefroy (now professor at the Imperial College of Science, South Kensington) as entomologist, and Messrs. Harrison and d'Albuquerque as honorary chemists. From that time onwards the number of scientific men employed in the tropical colonies has steadily increased, though at first public opinion was opposed to such appointments, on the supposition that scientific work was unlikely to have much bearing upon practice in agricultural matters. This expansion is to some slight extent due to an element of good fortune which attended these pioneers, who were markedly successful in their early work, of which that of the first two may be quoted as an example. Mr. Green, with years of practical experience as a tea planter, made recommendations for the treatment of disease which were at once practical, economical, and successful, while Mr. Parkin devised the method of coagulation of rubber latex which is still followed. At first, the appointments were chiefly of officers to deal with diseases, or of chemists to deal with soil questions, and in this and other ways the old botanic gardens in some of the most important tropical colonies developed into Departments of Agriculture.

There are several essentials in the equipment of a scientific officer for the tropics, though naturally the training of each must vary with the duties which he is to undertake. These essentials are well set forth by Prof. Farmer in a pamphlet recently issued.* In the first place, the officer must, of course, have a thorough knowledge of the science with which he is to be concerned, a knowledge best obtained at one of the universities, where he should have taken a good degree in honours. Next in importance is a good general knowledge of tropical agriculture, and (especially in the case of officers like entomologists, who have to make recommendations which involve the outlay of money) of the economics of the various cultivations. Such knowledge is best obtained in a tropical country, and if the individual cannot afford to spend some time at such a place as the Imperial College of Tropical Agriculture in Trinidad, he should learn his work by being attached as assistant to some officer with long experience of the tropics. In the third place, the man should have a capacity for research, sufficient at any rate to enable him to find out the life-history of a disease, to test new plants or new conditions, to advise as to the best manures for unfamiliar soils, and such matters. While this capacity is largely inborn, it may be much improved by work under a capable and experienced chief, under whom he may carry out definite pieces of research. Finally, a most desirable part of the equipment is a capacity for giving—in speaking or in writing—clear and easily understood accounts of any work that has been carried out, whether his own or that of other workers. It is through the work of men of this type, adequately trained and reasonably paid, that, as Mr. Ormsby-Gore remarked, "we shall be justified in history as a great Imperial Power."

* "On the training of Scientific Officers for Tropical Plantation Industry," by Professor J. B. Farmer. Reprinted from the Official Report of the Brussels Conference, 1924; published by the Rubber Growers' Association, Inc.

COTTON NOTES.

THE first number has come to hand of the *Australian Cotton Grower and Dairyman* incorporating the Australian Cotton Grower, and the Cotton Farmer and Dairyman. A good deal of the information in it is of purely local interest, but the data on the yield of cotton in Queensland are worthy of comment. It appears that the mean yield of seed cotton per acre on the 40,000 acres grown in Queensland last year was only 307 lb. per acre, drought being said to be responsible.

An article on Hybridisation of cotton by Thos. L. Bancroft upholds the view that natural crossing of cotton does not occur. His view is contrary to that of every botanist of repute who has worked on cotton, and the number of biological fallacies which abound in his article make one wish that periodicals did not become inaccurate in proportion as they become popular.

The quality of ratooned Queensland cotton is the subject of a paper by Mr. Frederick Summers in the *Journal of the Textile Institute*, December, 1924. It is a curious fact that throughout the controversy which has raged in Queensland over ratooned cotton nobody has made it their business to conduct an examination of first and second year cotton to see what the difference really is. Casual examination has been made by brokers and others, but the data given in Summers' paper constitute the first attempt to settle the vexed question of the quality of ratooned cotton. The facts obtained appear to establish that in two representative samples ratoon staple was 6 per cent. shorter and less uniform than that from annual plants. The hair width was about the same, while both wall thickness and breaking load were lower in ratoon. The hair weight per centimetre was also less in the ratooned sample. It is, however, not clear whether the differences found would affect spinning quality, and it is a pity that a spinning test was not carried out with the same material. It would have been of value also to have put forward the statistical constants of the mean values obtained for the measureable characters dealt with.

While Mr. Summers is on safe ground in stating that on the whole ratoon cotton is inferior in quality to annual, his argument that the cutting back of cotton after the first crop is equivalent to the hard pruning which young fruit trees receive after planting is less convincing. The analogy is not a good one for the following reasons :—

1. Cotton of the Upland type is like a good many other tropical mesophytes. It has very little storage capacity, and lives almost from hand to mouth.

2. Thesevere pruning given to young fruit trees is not given after a heavy crop has just been produced. If a good bearing fruit tree were cut practically level with the ground, it would be analogous to the ratooning of cotton.

3. Cotton has no normal rest period. When cut back the new shoots produce flower buds when only a few inches long and the plants attempt to be continuously reproductive. This is far from being the case in fruit trees.

A correct physiological appreciation of the ratooning question only becomes possible when it is realised that the operation entails the removal of about 75 per cent. of the dry weight of the plant just after it has produced a heavy crop.

Mr. Summers states that there are no grounds for regarding the first year's crop as a maximum, seeing that the root system, on which crop production ultimately depends, can only develop to a limited extent during the first year. Consequently, he continues, the frst year's crop must necessarily be inferior to that which can be borne in later years when the development of the root has increased. The fallacy here is in ignoring the fact that an ordinary cotton field contains something like 30,000 plants per acre and that the total mass of the root system is as much as the soil will carry. The total root system being at a maximum the first year, it cannot be above it in any subsequent year, and owing to reduction of soil fertility by removal of seed, lint, and bush, is almost bound to be less. This is why the yield of ratooned Upland is almost always less than that of the first year, unless that of the latter is reduced by abnormal shedding.

In the same number of the *Journal of the Textile Institute* Mr. Ernest Canney writes on Rain Grown cotton and climate. He makes a general survey of the climate factor, and from it attempts to indicate the potential capacity of the world as a whole to produce cotton under rainfall conditions. It is the belief of the reviewer that surveys of this kind are of very doubtful value, and if attempted at all should be based on physiological and climatological observations made in the areas talked about. Too many people have already sat on office chairs in England and told us where and how to grow cotton in the Colonies. Mr. Canney, however, has read the literature with extreme care and has produced an interesting paper. He lays great emphasis on cloudiness as a climatological factor, probably correctly, although data are too scanty for adequate generalisation. He is probably right from a cotton growing point of view in regarding much of Tropical Africa with suspicion, and in looking with favour on such areas as S. Sudan, N. Nigeria, S. Africa, and the Argentine, Uruguay, Paraguay, S. Brazil belt.

S. C. HARLAND.

All communications relating to *Tropical Agriculture* should be addressed to the Editor, *Tropical Agriculture*, The Imperial College of Tropical Agriculture, St. Augustine, Trinidad, B.W.I.

AGRICULTURAL NOTES.

COMPILED BY THE COLLEGE DEPARTMENT OF AGRICULTURE.

Germination of Cotton Seed.

COTTON growers have from time to time reported instances of poor germination of cotton seed even under favourable field conditions. Causes of this have not infrequently been due to insufficient care in storing seed intended for planting purposes. It is well known that the percentage of germination decreases with the age of the seed and this deterioration is accentuated by improper handling and storing. Seed for planting kept in bulk or in a damp, unventilated place, especially if it has not been subject to thorough air-drying previously, is liable to excessive heating, which destroys its vitality. Best results are obtained by spreading the seed in layers on the floor of a well ventilated room so that it may be turned from time to time.

If cotton seed for planting is purchased, a germination test should first be made, and this can be carried out quite simply and quickly by placing 100 seeds from an average sample between moist layers of cloth or blotting paper in a suitable container. With a good sample, 80 to 90 per cent. will be obtained.

In a recent paper by E. H. Toole and P. L. Drummond in the *Journal of Agricultural Research*, the germination of cotton seed is discussed as a result of the variable and often unaccountably low germination obtained with Texas seed, both in the seed laboratory at Washington and in the laboratory of the Texas Agricultural Experiment Station. After much study, it was found that there may be three distinct classes of samples :

(1) Strong samples in which a large percentage of the seeds will germinate well under a wide range of conditions ;

(2) Samples which contain many dead or weak seeds which always fail to produce healthy seedlings ;

(3) " Sensitive " samples, in which a large percentage of the seeds are viable and capable of producing seedlings, although there is a tendency for these to succumb under unfavourable conditions of environment.

It was noticed that the seeds in class 3, in germination tests by standard methods, are often covered by a fungus growth, many of the sprouts being watersoaked and decayed. Contrary to expectations, it was found that heating in storage was not the cause. By the use of special methods, notably thorough wetting of the fuzz of the seeds before they were put to germinate, a high germination of many of these so-called " sensitive " samples could be obtained, which under favourable field conditions are capable of producing a good stand. On the other hand, they are not to be relied on like the strong samples, being less able to withstand extremes of temperature or moisture.

From the results of these investigations, it would appear that the moisture content of the stored seed is an important factor in the germination of " sensitive " samples. As the moisture content falls below about 10 per cent. a gradual increase in the tendency of the sample to become mouldy and decay during germination, was noticed. The problem is complicated, however, by the fact that while the drier seed may not germinate so promptly it will keep its vitality longer during storage. Germination may be hastened, under unfavourable conditions of moisture in the field, by wetting cotton seed containing less than 12 per cent. moisture (approximately) just before planting. About two gallons of water to every 100 lb. of seed is sufficient, evenly applied by sprinkling and thorough mixing.

In general, it may be said that cotton seed, even of the highest quality is more sensitive to conditions of germination than the seed of most field crops, hence every precaution should be taken in harvesting and storing to insure sound seed.

Jala Maize.

In the *Journal of Heredity* for August, 1924, a description is given of this maize, a giant variety cultivated in the locality of Jala, Mexico. The plants are said to average 20 feet in height and the ears about 20 inches in length and 9 inches in circumference. The number of seeds on an ear ranges from 700 to 1,000 the mean weight of a single seed being over ·6 grams. The stalks, it is said, furnish very suitable material for fencing in a region where other material for this purpose is scarce. This variety is under observation by the United States Department of Agriculture. In the vicinity of Washington, D.C., it reaches a size almost as great as it does in its native home, but the season is too short for mature seed to be obtained. In Southern California it is reported as maturing normally under irrigation conditions.

In Mexico, according to Mr. J. H. Kempton of the Bureau of Plant Industry, Washington, this corn is planted in rows about 3 feet apart each way, two plants to the hill being aimed at. It is sown in April and reaped in November so that a long season is required, which makes this type of maize of little value to the corn growing region of the United States, where in yield per acre it is perhaps exceeded by the best varieties already grown. As it is doubtless worthy of consideration in tropical countries, this department recently obtained a small quantity of seed for trial through the courtesy of the United States Department of Agriculture. An excellent germination was obtained and the plants, in spite of some attention by caterpillars, are now about 5 feet tall.

THE TROPICAL WORLD.

Australia.

The present position of the groundnut industry in Australia is reviewed in a recent number of the *Industrial Australian and Mining Standard* (1924, 72, 353). The bulk of the Australian crop is grown in Queensland, Northern Territory, and in the northern part of New South Wales. The seed is sown in October to December and the nuts are ready to harvest four or five months later. It is considered that the industry badly needs re-organization. In the first place, as a general rule, the wrong variety of groundnut is grown, the greater proportion being Red Spanish. The markets of Sydney and Melbourne, however, require White Spanish or large White China variety for their roasting trade. The Red Spanish variety is similar to the White Spanish except that the kernels of the former type are covered with dark red skins, and are somewhat bitter and slightly yellow. In addition, they are not so suitable for roasting, for which purpose most of the imported groundnuts are used. The large White China variety has not been grown on a large scale in Australia to compete with the imported nuts, as it is claimed that the soil in practically all the areas under this crop is very dark red or chocolate-coloured, which stains the shells badly, so that the product is at a disadvantage in comparison with the clean, bright shells of the imported nuts. Where this variety has been grown on areas with light soil in Australia, the quality of the crop has been practically equal to that of the imported kinds. As a result of the cultivation of the wrong type, there was an over-production of four to five hundred tons in 1924. To improve the position of this industry in Australia, many growers have combined to regulate the prices and to induce the Custom Authorities to prohibit the importation of the large White China nuts, on which there is at present a tariff of 4d. per lb. Such an embargo is stated to be unnecessary if the growers will cultivate the variety required by the consumer, and will reduce the cost of production by the use of modern machinery and up-to-date methods and be satisfied with a fair profit. Some growers ask as much as £56 per ton for their produce, while others have expressed willingness to put large areas under cultivation if they could be guaranteed a price of £20 to £25 per ton on rail or boat. The cost of production per acre is given at £6 to £8, the cost of land at £8 per acre, and the yield per acre as 16 cwt.

For use for oil extraction, the Australian growers must deliver their nuts at a maximum price of £17 10s. per ton at the mills if the locally produced oil is to compete with the imported English or Japanese oil. The prospect in this direction is not bright, especially in view of the fact that if the area under cotton is increased largely, cotton seed will probably be available in sufficiently large quantities to meet the local demands for a vegetable oil.—(*Bulletin of the Imperial Institute.*—Vol. XXIII, No. 1.)

Philippines.

All of the centrifugal sugar mills in Negros and Panay are grinding at full capacity and the estimates which forecast a bumper crop in the Southern islands, as well as in Luzon, will undoubtedly be fully realised, according to reports brought back by George H. Fairchild of the Philippine Sugar Association, who returned last week from a visit south. Many of the centrals have so heavy a tonnage of cane that they will have to grind many weeks longer than usual. Some of them, said Mr. Fairchild, really do not know yet how much cane they have, and final outturn figures will depend upon how much of the crop they will be able to put through the mills before grinding has to cease.

The continuance of the rains at the present time, in addition to hindering the production of muscovados, is affecting unfavourably the prospects for the 1925-26 crop, as it has been impossible to plant new cane on the lowland haciendas which comprise the bulk of the cane lands of Negros and Panay. This is a condition which indicates the necessity of fresh drainage systems for these districts if sugar production is to be conducted economically and efficiently. It is not profitable under present conditions for the mills to maintain equipment to handle peak crops which come only once in several seasons, while the rest of the time their excess capacity is earning nothing.—(*Facts about Sugar.*—Vol. XX No. 14.)

The Netherlands East Indies.

The Department of Overseas Trade has received the following extracts, published by Jurgens Commercial News and Advertising Agency, Bandoeng, Java.

It is generally held by the native cultivator in Djambi that a tappable tree yields an average of from a cattee (1¼ lb.) to a kilogramme (2⅛ lb.) of dry rubber per year, and this is a fairly accurate estimate. According to this estimate, the total number of trees in Sumatra may be placed at 40 to 50 millions, approximately (excluding young, untappable trees), while the total number of trees planted may be fixed at 100 millions. The tappable trees may be roughly apportioned as follows:—25,000,000 in Djambi, 10,000,000 in Indragiri, 3,000,000 in Siak, and the rest in Palembang.

In Mid-Sumatra, production is controlled by the labour available and the high wages demanded by tappers. The maximum production in this area will therefore probably not exceed 60,000 tons, or 40,000 tons of marketable rubber. The cultivation is seen at its best in the thickly-populated areas and along navigable rivers, and very flattering opinions have been formed of the native cultivation generally after a visit to just this area. The cultivation proves remunerative to the native only when the price in the entire tapping areas is about f. 45 (one florin = 1*s.* 8*d.*) a picul (133⅓ lb.).

For European plantations run on sound lines, the native industry does not form a source of danger, and the competition offered by the latter can best be met by further effecting reduction in the cost of production of the European article, and this is to be attained principally by increased production per unit ; the forming of a selling organisation, and the avoidance of forward sales, will also have a very advantageous influence on the European cultivation.

The method of tapping is left to the discretion of the tapper ; these being the " V " cut on half the circumference, and, later, the spiral and herring-bone cut, at about 60 cm. height. Alum is used as coagulant, a tapper consuming half a cattee a day. The price of alum varies, at Djambi about f. 11 a picul, and, further inland as much as f. 25.

No disease of any consequence has as yet been ascertained in the native rubber areas in Djambi, where the number of trees increases yearly.

Tanganyika.

Mr. W. Ormsby-Gore (Under-Secretary for the Colonies), who presided on Tuesday at a meeting of the Royal Colonial Institute, when Mr. C. F. Swynnerton read a paper on " The Problem of the Tsetse Fly," said that at least half of the area of Tanganyika Territory was to-day dominated by the tsetse fly.

" People in this country and even in Africa," he proceeded, " do not realise the importance of the problem. The tsetse fly tends to depopulate some of the richest countries in Africa. People think that the chief danger is that of sleeping sickness but that is only one incident in the problem. Where the tsetse is there can be neither cattle nor animal transport, and it is almost impossible to get natives to live without cattle. The result is that where the tsetse fly advances—and it is advancing—the country is given over to bush, and so the vicious circle begins, because the fly can only breathe and exist where there is bush."

Nothing short of the elimination of the fly would prevent periodic outbreaks of sleeping sickness. It was a big job, involving the ridding of hundreds of thousands of square miles of the pest, and Mr. Swynnerton was the first man to tackle the problem from the right end.

'I want to pay, on behalf of the British Government, a special tribute to Mr. Swynnerton's initiative," said Mr. Ormsby-Gore, in conclusion, " and to his efforts in this direction. I believe he has succeeded, but only because of co-operation of the natives." The solution of the problem was to be found in the concentration of natives in settlements with villages dotted about near each other. Thus the bush was kept clear by the gathering of firewood, and the fly excluded.—(*The African World.* — Vol. XC No. 1168.)

Hawaii.

Completed financial and production figures give 1924 place as a very satisfactory year from the standpoint of the sugar industry of Hawaii.

February was one of the warmest months for the time of year that Hawaii has known for several years. Considerable apprehension is being felt in many quarters that there will be a shortage of water for the summer months, unless there is a decided change in the very near future.

A considerable number of the plantations, especially on Hawaii depend, altogether, or to a great extent, upon flumes to transfer the cane from the field to the mill. Unless there is water, some of these mills are required to close down because sufficient cane cannot be got to the mill.

The large artesian basins from which a great deal of the irrigation water is secured on Oahu are also dependent upon plentiful rainfall to refill these basins during the rainy season.

One serious menace to the water supply of Oahu is the lack of sufficient forest reserves to act as watersheds. This lack of forest reserves has been realised by the commissioners of agriculture and forestry and for many years by those interested in the sugar industry of the island, but so far steps to remedy this condition have been unsuccessful, due partially to conflicting interests among those who control the land which is desired for these reserves.

The new building for the department of sugar technology of the Hawaii Sugar Planters' Association Experiment Station is now nearing completion and will probably be ready for occupancy during the latter part of this month. The new building is up-to-date in every respect and will fill a decided need in the activities of the department.—(*Sugar.*—Vol. XXXVII No. 4.)

Cuba.

Considerable interest attaches to the official estimate of the Cuban Department of Agriculture, just issued, concerning the Cuban sugar crop. The total is placed at 4,474,300 tons. This is considerably below some of the estimates which have been handed about recently, although it must be conceded that recent developments have materially changed some of the previous conditions. Low extraction is one of these factors, and this is due to some extent to weather conditions which have retarded the handling of ripened cane. A very large number of disastrous cane fires has occurred, and this, combined with unsettled labour conditions, has held back the crop and decreased the possible production below the earlier estimates.

The latest estimate of the National City Bank places Cuban production to February 28, at 2,008,602 tons, as compared with 1,793,607 tons on this date last year.

The Mill Owners' and Planters' Association is being asked to open the question of readjustment of rates charged by railway companies in handling cane.

An interesting economic development is the formation of several additional cane planters' associations. Among these are associations in the districts Central Agramonte, Central Pilar, and Central Mercedes. An indication of the trend of advance as regards these associations is the request by the Yaguajay association for an allowance of one-half arroba (1 arroba=25·317 lb.) of sugar additional for each one hundred of cane furnished. Plans are being prepared for the construction of a new cane sugar factory near Amorillas.

Recent developments in the labour situations are the strikes of stevedores and the cane cutters at Centrals Chaparra and Delicias, both belonging to the Cuban American Sugar Co.. The net result of the operation was the closing of the two mills in question, which are among the largest on the island. The difficulty was over a higher wage scale. Strikes are also reported at Soledad and Gomez Mena.—(*Sugar*.—Vol. XXVII No. 4.)

British Honduras.

Official statistics reveal a steady growth in the export of domestic produce from British Honduras during the January-November period of last year, as compared with the corresponding eleven months of 1923. The total value of these exports for the 1924 period showed an increase of $391,069 over those for the same period of 1923, the figures for last year being $1,442,162. Shipments of mahogany during that period jumped from 5,227,908 superficial feet in 1923 valued at $540,067, to 9,810,869 superficial feet valued at $969,793, of which the United States took 7,626,897 superficial feet and the United Kingdom 2,168,304 superficial feet. A promising trade was built up during the year with the United States in what are known in the Colony as secondary woods. There was also a surprising increase in the shipments of cedar, of which 427,379 superficial feet were shipped to the United States in 1924, and 89,654 superficial feet to the United Kingdom. Figures for chicle, all of which goes to the United States and is used largely in the manufacture of chewing gum, were not so satisfactory. Of this product exports for the eleven months amounted to 264,402 lb. as against 356,076 lb. Logwood exports increased from 999 tons in 1923 to 1,302 tons last year, shipments in both years being fairly evenly divided between the United Kingdom and the United States. There was a slight decrease in the sales of coconuts to the United States, but against this a new market was found in Cuba. Shipments of copra for the eleven months dropped heavily to 408,246 lb., from 1,831,085 lb., but there was an increase in the exports of bananas, of which 384,295 bunches were sold in 1924, as compared with 311,983 bunches in the previous year. The United States purchased more plantains during the eleven months period of last year, but there were fewer shipments to the Republic of Honduras, while a new market was found for this fruit in Mexico. The quantity of tortoise shell sent to the United Kingdom showed an increase from 1,740 lb. in 1923 to 5,418 lb. last year.—(*The Chamber of Commerce Journal*).—Vol. XLIX No. 583.

The Sudan.

The Empire Cotton Growing Review Vol. II No. 2 contains among other highly interesting and useful articles, a series of three articles on cotton growing in the Sudan, South Africa, and Queensland. It is the section dealing with the Sudan to which we wish to draw attention. Here all cotton grown under the Gezira scheme is graded by officials of the Sudan Plantations Syndicate at their ginning factories. These officials are usually Greeks or Egyptians who have been trained by leading cotton exporting firms in Egypt, but at a later date it is proposed to train Sudanese for the work. The rates of pay vary according to the capabilities of the men employed, and are generally somewhat higher than those ruling in Egypt for similar work, housing and return fares to Egypt being additional expenses. A man can sample about 800 bales a day, the cost of the operation being shared by the partners in the ownership of the cotton. The packing of these bales of seed cotton is done by the tenant at his house situated alongside his cultivation, and each bale weighs approximately 400 lb. If his cultivation is situated comparatively near to the factory the bales are transported by camel direct, but failing this the cotton is sent by camel to one of the collecting stations and is consigned from there by train to the factory. Each bale bears the tenant's name and his number, and on arrival at the factory is weighed and graded. All the cotton is graded before ginning, the operator making a small slit in the cotton pack from which he draws a sample. The cotton pack itself weighs from 3 to 3½ lb. and can sometimes be used to make two journeys.

Jamaica.

Mr. James Cormack, Canadian Commissioner in Jamaica, writes as follows, in the *Canadian Commercial Intelligence Journal* Vol. XXXII, No. 1106, on the present condition of the Blue Mountain coffee industry in Jamaica :—

The Blue Mountain coffee estates all suffered from a succession of four hurricanes in three years some time ago, and are only now showing some signs of recovery. This year their output will probably be over the average for the past four years, but this will be below the average of a period of say twenty years back. An average coffee crop for Jamaica would be about 50, 000 cwt. of which not quite 10 per cent. would be classed as Blue Mountain. Even the grade "Blue Mountain" coffee is not fixed. A lot of coffee is bought in the lower districts and valleys of the Blue Mountains, which is sometimes classed as Blue Mountain coffee, but is by no means up to the standard of good Blue Mountain coffee either in appearance or in quality.

Readers are requested to inform the Editor immediately of any change in address.

TANGANYIKA.

Agricultural Development during 1924.

H. WOLFE.

Deputy Director of Agriculture, Tanganyika Territory.

THE cotton crop in Tanganyika Territory is harvested from August onwards and the ginning is not completed until the following May. A fairly accurate estimate may now be given of the total 1924 crop and this is placed at 17,250 bales of 400 lb. each, an increase of 50 per cent. over the previous year's crop, which in turn was 60 per cent. higher than that of 1923.

The Greek colonist who was present in the country under the German regime, is now settling in the Territory in larger numbers, coming principally from Egypt, attracted by the now well-known suitability of the country for cotton, sisal and coffee. The first attracts the largest number of these settlers. Fresh land is being cleared and planted with the three crops mentioned and the Territory may be said to be enjoying a decided agricultural boom, though by no means an ebullient one.

Another class of non-native planter whose numbers have increased is the Indian. The Indian immigrant, however, is primarily a trader and only becomes a planter when good prices prevail for annual crops—unlike the Greek immigrant who usually becomes a permanent settler, with an initial aim of acquiring his own estate.

The attached comparative table of exports will show the progress that has been made in recovering the ground lost during and immediately after the East African campaign of 1914-18, which brought about the inevitable abandonment or neglect of plantations incidental to war. In all plantation products now, except sisal, the annual quantity of exports exceeds that of 1913, in some cases considerably so. It is of interest to compare the order in which the products are placed in respect of value, in 1913 and 1924.

The present new railway construction in the Territory is designed to serve the coffee and maize district of Arusha (north-central) and the cotton and groundnut district of Tabora (central).

Ploughing by natives for cotton planting is now successfully established in the Tabora district and has been introduced into the Mwanza district, which is bordered by Lake Victoria Nyanza.

The staff of the Department has been increased by the addition of one Senior Agricultural Officer and four District Agricultural Officers.

Principal Exports of Tanganyika 1913, 1922 and 1924.

	1913.		1922.		1924.			
	Order.	Percentage of total.	Order.	Percentage of total.	Order.	Percentage of total.	Quantity Cwts.	Value in £ (sterling).
Sisal	1	30.1	1	22.3	1	23.9	368,560	644,835
Cotton	4	6.7	4	10.8	2	13.8	50,828	373,710
Groundnuts	6	5.3	3	14.7	3	13.3	373,680	359,918
Coffee	8	2.6	2	15.7	4	13.1	105,222	352,529
Hides and Skins	3	15.4	6	5.2	5	6.9	50,948	185,843
Copra	5	6.6	5	6.9	6	6.6	162,500	178,194
Simsim	9	1.1	8	3.8	7	3.0	78,180	80,324
Rice		0.5	9	2.0	8	2.2	62,235	59,866
Millet		0.3	7	4.7	9	1.9	158,332	49,976
Beeswax	7	4.0	10	1.9	10	1.7	8,497	44,666
Plantation Rubber ..	2	17.4						
Ghee	10	0.8						

MYCOLOGICAL NOTES.

Behaviour of some varieties of Cane to Mosaic Disease in the Hawaiian Islands.

WHILE none of the varieties of thick cane under cultivation is immune to infection by mosaic disease and all suffer appreciable reduction of yield when infected, a distinction of economic value has been made between those kinds which are resistant or susceptible to infection and between those also which are tolerant or sensitive to the disease. The categories overlap and a variety which, for instance, is resistant to infection may be very sensitive when infected. Experiments carried out by the Experiment Station of the Hawaiian Sugar Planters' Association on several occasions, indicate that a third distinction between thick cane varieties can be made based on the ability of stools to partially or wholly recover from mosaic. In January, 1911, Lyon planted healthy seed of Lahaina cane which gave healthy shoots, but 35 of the stalks developed secondary infection during the first six months of growth and each was tagged as soon as mosaic appeared. Four months later seven out of the 35 infected stalks gradually threw off the disease, the leaves as they unfolded becoming finally quite free from symptoms. When the canes were harvested top cuttings from five of the recovered stalks were planted and gave rise to shoots showing no signs of mosaic.

Kunkel has recorded cases of recovery in seedlings of Lahaina parentage transplanted from pots to experimental plots. Between 300 and 400 healthy seedlings were set out in April, 1920. By September, 22 of the stools had shown mosaic in one or more stalks due to secondary infection. Seven of the stools had recovered, however, young leaves on all the stalks being free from mosaic and these stools were still healthy when the canes were cut in May, 1922. Cuttings planted from these recovered stools gave rise to healthy shoots. After three months a few cases of disease due to secondary infection appeared in these plants indicating that recovery from mosaic had not conferred immunity to infection on the growth from the cuttings.

In 1920 extensive experiments were carried out by the Station on a number of plantations in the islands for the purpose of demonstrating to planters on their own land, the losses resulting from the planting of mosaic infected seed of the varieties grown on a commercial scale. Twenty-four rows of each variety were planted, five diseased and five healthy seed-pieces being placed alternately in each row giving a total of 240 cuttings of which one-half were diseased. The stools were inspected about two and six months after planting and the occurrence or absence of mosaic in each recorded, no distinction being made, unfortunately, between complete and partial infection. The canes were cut after nineteen to twenty-four months but all varieties at the same time in each experiment and the yield from every stool was recorded. An inspection of the ratoons was made after they were up and a distinction noted between partially diseased, fully diseased and healthy stools.

Kunkel has recorded the results in detail at two plantations in the same island—Pearl City and Waialua on Oahu. At Pearl City the varieties used were Badilla, H. 109, Lahaina, Striped Tip and D. 1,135. At Waialua three of these varieties were planted, namely, H. 109, Lahaina and D. 1,135, Yellow Caledonia and D. 117 being substituted for the other two kinds.

The conditions in regard to secondary infection were very different at the two plantations although both were in the same island. At Pearl City secondary infection was slight, but at Waialua it was intense. The behaviour of the three varieties grown at both plantations may now be considered. Although no distinction was made between partially and wholly diseased stools in the young plant cane, it may be assumed that those arising from diseased cuttings, recorded as infected after two months, were infected in all the shoots. This assumption holds good even for Waialua where no secondary infection on growth from the healthy cuttings was apparent at the first inspection. Some of the seed failed to grow and supplies were put in after the first inspection. The writer, however, has considered the results only from the original seed which grew and gave growth also as ratoons, so that his figures differ somewhat from those recorded by Kunkel.

D. 1,135.

At Pearl City 80 per cent. of the healthy cuttings grew and 61 per cent. of the diseased cuttings. The shoots from the healthy cuttings were free from disease after two and seven months. The ratoons inspected four months after the plant cane was cut were wholly free from mosaic. All the stools from diseased cuttings were fully diseased at the first inspection and were still diseased at the second inspection. In the ratoons 51 per cent. of these stools were fully recovered, 49 per cent. partially recovered and only 1 per cent. fully diseased. The reduction in yield from planting diseased seed was 41 per cent.

At Waialua 95 per cent. of the healthy cuttings and 90 per cent. of the diseased seed grew. The shoots from the healthy cuttings were free from disease at the first inspection made eleven weeks after planting. At the second inspection made eleven weeks later 90 per cent. of the stools were found infected. When the ratoons were inspected two months after the plant cane was cut 14 per cent. of the stools were found free from mosaic, 83 per cent. partially and 3 per cent. fully diseased.

All the stools from diseased cuttings were fully diseased at both inspections. In the ratoons 6 per cent. of the stools were fully recovered, 87 per cent. partially recovered and 7 per cent. fully diseased.

The reduction in tonnage resulting from planting diseased seed was 32 per cent.

The results obtained with the three varieties grown at both plantations are summarised in the table which follows, the figures being expressed as percentages :—

Pearl City.

	D. 1,135	Lahaina.	H. 109.
Healthy cuttings which grew	80	91	70
Diseased cuttings which grew	61	86	53
Secondary infection of healthy stools	none	14	none
Ratoons.			
From healthy seed—fully infected	none	10	1
From healthy seed—partly infected	none	4	4
From healthy seed—free from infection	100	86	95
From diseased seed—fully infected	1	99	52
From diseased seed—partly infected	49	1	35
From diseased seed—free from infection	51	none	13
Reduction in yield of plant cane from diseased seed	41	72	37

Waialua.

	D. 1,135	Lahaina.	H. 109.
Healthy cuttings which grew	95	81	98
Diseased cuttings which grew	90	94	99
Secondary infection of healthy stools	90	92	57
Ratoons.			
From healthy seed—fully infected	3	83	43
From healthy seed—partly infected	83	8	42
From healthy seed—free from infection	14	9	15
From diseased seed—fully infected	7	99	84
From diseased seed—partly infected	87	1	15
From diseased seed—free from infection	6	none	1
Reduction in yield of plant cane from diseased seed	32	28	38

At Pearl City where there was little secondary infection to obscure the issue D. 1,135 showed remarkable powers of recovery from primary infection and even at Waialua most of the ratoon stools from the diseased seed were on the way to recovery. The resistance of this exceptional thick cane to infection under conditions where it is not intense, its tolerance and its powers of recovery explain its successful employment in Hawaii and Australia for cleaning up heavily infected plantations by means of seed-piece selection and rogueing. H. 109 is another exceptional seedling which surpasses D. 1,135 in resistance to infection, but has substantially less powers of recovery.

At Waialua the difference between the effects of primary and secondary infection were brought out clearly by H. 109; while the planting of diseased seed resulted in a reduction in yield of 38 per cent., the plant cane which became secondarily infected yielded almost as heavily as the stools which remained healthy confirming observations made in other countries on other varieties. In these experiments Lahaina showed practically no powers of recovery and behaved as regards susceptibility to infection and sensitiveness like most of the thick canes in cultivation. Kunkel has pointed out that partially infected stools may recover in another way, namely, by the suppression or smothering of the diseased by the healthy stalks. It may happen, however, that when such stools are cut, buds at the base of the suppressed diseased stalks grow and show infected shoots, a tendency which may account for the difficulty of ridding a field from the last traces of mosaic.

S. F. A.

References.

Bulletin Experimental Station, H. S. P. A. (botanical series), Vol. 3, Part I.

Bulletin Experimental Station, H. S. P. A. (botanical series), Vol. 3, Part II.

ADVERTISING COCOA.

CONSIDERABLE progress can be reported regarding the efforts of increasing sales of cocoa by advertising. The Memorandum and Articles of the Co-operative Society of Cocoa Planters of Trinidad and Tobago, Ltd., have been drawn up, and Sir Francis Watts, K.C.M.G., appointed the first President. The Society has been formed to co-operate with the Cocoa Planters' Co-operative Alliance, Ltd., registered in England, and efforts are now on foot to secure a loan for the purposes of the Society.

It is of interest to note that the Cocoa Merchants' Association of America, Inc., which includes the majority of the United States of America cocoa importers and dealers among its members, recently called a special meeting to discuss the necessity and feasibility of beginning an advertising campaign in the United States of America. The suggestion was enthusiastically adopted by the meeting, and many of the members present intimated their willingness to contribute towards an advertising fund. The Chairman of the Cocoa Manufacturers' Association of America, who was present, undertook to communicate this decision to the members of his Association. Meantime the Cocoa Merchants' Association is getting into touch with all other organisations interested in cocoa with a view to co-operating for the common purpose. With a world-wide combination of planters, merchants, and manufacturers some important developments may be anticipated in the near future.

C. Y. S.

ENVIRONMENT AND QUALITY.

J. B. HUTCHINSON, B.A.

THERE seems to be a tendency in agricultural practice to lay more stress on yield than on quality. Two reasons may be given for this; first, that variations in yield, being strictly measurable, are more noticeable than variations in quality, which are generally matters of personal opinion, checked only by comparison with standards; second, producers disposing of their crops to merchants often find it difficult to obtain a premium for superior quality adequate to repay their extra outlay. This difficulty is a very great obstacle to the spread of cultivation of better quality cottons in India. The spread of the cultivation of "strong" wheats in England is delayed by the refusal of the millers to pay an adequate premium for the better quality.

Scientific study of crop plants has had a similar bias in favour of yield, and particularly in investigations on the influence of environment on crops has the study of quality been neglected. Recently, however, a certain amount of information on the effect of environment has been obtained by plant breeders in the course of investigations on the inheritance of quality.

The well-known phenomena of "degeneration," or "running out" of varieties of crop plants were formerly ascribed to the "instability of highly bred varieties" and consequent "reversion to type." Genetic investigation has shown that in a genetically pure line, no progressive deterioration will occur, so long as natural cross fertilisation and mechanical mixing of seed are avoided. Commercial varieties of most crop plants are genetically mixed or are subjected to crossing and seed mixing during the ordinary routine of agricultural practice which constitutes their environment. Those components of the mixture yielding most seed under these conditions will be represented in greater proportion in each succeeding crop. A progressive change will take place in the constitution of the mixture, and if the quality of the produce of the highest seed-yielding component differs from the average quality of the produce of the original mixture, a progressive change in quality will result. This change may be either an improvement or a deterioration, but as deterioration is a great deal more frequently noticed than improvement, it is deterioration that has been studied.

An excellent example of swamping of superior strains in a mixture resulting from natural crossing is afforded by the "running out" of cotton varieties in Egypt. Strains giving a high seed yield and relatively poor lint arose as segregates from natural hybrids, and in a few years the desirable characteristics of the original strain were lost in a mass of mediocre mongrels. The effect of the environment is not on the quality of the lint, but on the seed producing capacity of strains possessing lint of varying value.

The quality of the produce of a variety may be radically changed with a change in environment. The genetic constitution of the plant is unaltered, but its reaction with a different environment produces a very different result. St. Vincent Sea Island varieties grew excellently under irrigation conditions in the Sudan, but the lint hairs produced are said to have been "rod-like" and almost useless for spinning purposes.

The reaction of wheat to irrigation conditions varies in different closely allied strains. A number of strains of macaroni wheat first isolated at State Experiment Stations in the American wheat belt, and yielding there a high quality of grain, were transferred to Arizona and there grown under irrigation. A large proportion of the strains introduced gave a soft, poor quality grain. A number of strains, however, yielded hard, high quality grain, under the same conditions. The new environment reacted differently on different strains revealing variations in genetic constitution not previously obvious. The belief, so firmly held until recently, that "strong" wheats could not be grown in England arose from similar results obtained from experiments on imported "strong" American bread wheats. While Red Fife and a few others will produce "strong" wheat under English conditions, a number of the best quality American and Russian bread wheats give a soft wheat when grown in England.

Apart from very large changes in environment, the ordinary seasonal fluctuations of climatic factors, soil conditions and so on, exert a considerable effect on the quality of a crop, bringing about seasonal variations which may be similar over a large area. The number of factors concerned, and the complexity of their inter-relations have made scientific investigations laborious and very often inconclusive. The best and most successful attack on the causes of seasonal fluctuations in quality was made by Dr. Balls on cotton in Egypt.

Quality in cotton ultimately depends on the presence of those factors which make it possible to spin it to a strong fine yarn. In the absence of more complete knowledge of the factors concerned in the production of good yarns, Dr. Balls investigated the effect of various environmental factors on lint length and hair strength. By taking daily pickings from carefully controlled plots of pure line material, a series of samples was obtained, each of which had been subjected to a slightly different environment. By determining mean maximum length by combing out the lint on the seed, and measuring the breaking load of each sample, curves of lint length and lint strength were obtained for the series of samples. It was found that there was no correlation between the strength of lint and the length of lint in the same sample, but that there was a marked correlation between strength of lint in a given sample, and the length of lint in the sample picked from the same plot 21 days later. Anatomical studies showed that the lint is growing fastest at about 28 to 30 days from maturity, and that the cell wall is thickening most rapidly at about 8 days from maturity. Consequently any change in environment will exert its greatest effect upon the strength of the lint in bolls due to open 8 days later, whereas its effect upon lint length will be upon lint in bolls not due to open for a month. There will be thus a three week interval before a change in environment, which has shown its effect in a change in lint strength, will also show its effect upon lint length. Under Egyptian conditions the most marked changes in the plant's environment are those resulting from the periodic changes in the water content of the soil due to irrigation and it was found that the general rise and fall of the strength and length curves follow the rise and fall of water content in the soil fairly closely if the curves are shifted back 8 days and a month respectively.

Absolute control of water supply and relatively constant conditions of temperature, humidity, sunshine, &c., make Egypt particularly suited for such investigations. The greater complexity of environmental changes in rain grown cotton areas make it difficult to analyse the results of such experiments conducted on rain grown cotton, and so far no one has succeeded in getting such close agreement between theory and expectation as Dr. Balls obtained in his researches in Egypt.*

Control of environment to improve the quality of the crop is practised intensively in tobacco culture. Each of the many forms in which tobacco is put on the market requires a particular grade and quality of leaf for its manufacture. Many of the chief tobacco growing districts have a name for particular grades of leaf suitable for certain purposes. While the type of leaf produced depends largely on the variety and the method of curing, the climatic and soil conditions determine within a fairly narrow range the varieties and therefore the type of leaf which will be most profitable in any particular district.

In districts specialising in the production of cigar filler leaf, heavy manuring with cotton seed meal and artificials is practised to produce a rapidly growing, luxuriant plant with large leaves. The plant is "topped" when it has produced 14 to 16 leaves, and all secondary shoots removed as they appear, so that the whole vigour of the plant is concentrated on leaf production. The main factor in quality in this type of leaf—besides good burning quality—is good aroma. The cigar wrapper trade, on the other hand, demands a thin leaf with small veins and little aroma, and in the cigar wrapper districts tobacco is extensively grown under cheese cloth shade and is allowed to run up and flower.

Good burning quality is, of course, of first importance in all types of leaf. It is recognised that burning quality depends very largely on the environment of the plant. Good burning quality is associated with freedom from gummy materials a low protein content, a low chloride content, and

*Compare Burd: "Cotton in St. Vincent," *Tropical Agriculture*, Vol. II, No. 4, p. 79.

a high ash content. Heavy organic or nitrogenous manuring tends towards the production of a leaf rich in proteins, and stimulation of yield with organic manures is liable to be at the expense of quality. Close spacing and heavy manuring with artificials is practised to promote free, but not rank growth, and to provide an abundant supply of the ash constituents of the leaves.

Except in tobacco, control of quality by control of environment factors is very rarely practised. Success has been achieved because the tobacco grower is catering for a luxury trade and quality is of more importance to him than yield, and because tobacco gives a product of very high value in proportion to the area under crop. It is therefore economically possible to go in for the intensive culture which must accompany heavy dressings of fertilisers, or to erect such expensive things as cheese cloth shades. Control of quality through environment in other crops has been limited to the selection of the environment, as in the Citrus industry, which has been built up in areas where ample sunshine and a dry atmosphere give optimum ripening conditions.

While useful beginnings have been made by empirical methods, it is probable that further advances will have to await detailed research into such problems as the physiology and biochemistry of the tobacco leaf. So long as we know little or nothing of what "quality" means, we cannot expect to improve it very greatly.

MR. ROBERT HARVEY.

WE regret to announce the death which took place at Pollokshields, Glasgow, on the 19th March, of Mr. Robert Harvey, late chairman and managing director of the Harvey Engineering Co.

Mr. Harvey, who was in his 76th year, was a native of Glasgow, where he spent the greater part of his life. After an apprenticeship in the firm of David Cook & Co., in 1870 he joined the Kinning Park Engineering Works started by his father, on whose retirement, ten years later, he became senior partner. The firm carried out marine and general engineering work, but specialised in the manufacture of sugar machinery. In 1886, Mr. Harvey joined the late Sir William M'Onie, Lord Provost of Glasgow, to form the concern of M'Onie, Harvey & Co., with Mr. Harvey as managing director. Later the style of the firm was changed to its present form of the Harvey Engineering Co. from the chairmanship of which Mr. Robert Harvey resigned, in 1917, on the grounds of ill-health. He was succeeded by his brother Mr. James Harvey, who with another brother, Mr. William Harvey, and three sisters, survives him.

The Editor will be pleased to send a gratuitous specimen copy of *Tropical Agriculture*, post free, to anyone interested in tropical development.

CHEMICAL NOTES.

Compiled by the Department of Chemistry and Soil Science.

Bloom on Chocolate and the Setting of Cacao Butter.

In the *Transactions of the Society of Chemical Industry*, February 27, 1925, p. 77, R. Whymper and A. Bradley give an interesting account of the causes and prevention of "bloom" on chocolate, a form of deterioration well known to confectioners and storekeepers.

There are two forms of chocolate bloom, sugar bloom and fat bloom. *Sugar bloom* is due to absorption of moisture by the sugar present in chocolate, and subsequent drying; this leaves minute crystals of sugar at the surface. Exposure to damp air and to large fluctuations of temperature, such as frequently occur in shop windows, are especially conducive to the development of sugar bloom. Furthermore, chocolate confections covered with chocolate containing fats of rather low melting point are particularly subject to sugar bloom, because the transference of sugar in solution from the interior to the exterior surface is easier when the covering is soft. This last factor is the common cause of sugar bloom of chocolates in the tropics.

Fat bloom is due to the excrescence of small fat crystals. The most acute form appears on chocolate which has been cooled very slowly, for, under this condition, the high melting fractions of the chocolate fat crystallize out as nodules. A less acute form, known as powdery bloom, forms on chocolate at temperature higher than that at which the chocolate sets, and appears under the microscope as small isolated crystals or rosettes of crystals. Fat bloom can partly be prevented during manufacture, by manipulating the chocolate so that the largest possible proportion of the high-melting fats separate and crystallize before the material is finally moulded.

Contrary to usual opinion, commercial cacao butters vary considerably in the relative amounts of high melting and low melting fractions that they contain; they consequently differ in their tendency to bloom when mixed into a chocolate mass. Thus, in a series of comparative experiments, Whymper and Bradley were able to demonstrate that chocolate made from West African cacao bloomed the quickest and to the greatest extent, followed by Venezuelan, Trinidadian, and Cingalese in the order given. The fats expressed from these types of cacao contained the following percentage amounts of high melting fractions (hard nodules); West African, 43·8 per cent., melting at 46°C; Venezuelan, 32·4 per cent. melting at 44°C; Trinidadian, 31·8 per cent. melting at 47°C; Cingalese, 30·7 per cent. melting at 44°C.

Sulphate of Ammonia and Soil Acidity.

Under this heading Sir John Russell draws attention, in a recent number of the *Journal of the Ministry of Agriculture*, to a letter appearing in *The Times* newspaper suggesting that sulphate of ammonia is an unsafe fertilizer owing to its souring effect on the soil. He points out that although many samples do contain a small quantity of free acid, it is quite insufficient to produce any significant effect in the soil. As it rots the bags and tends to become lumpy, the neutral sulphate now on the market is preferable, its finer condition also making for greater ease of application.

While it is admitted that the Woburn experiments have shown that sulphate of ammonia produces an acid effect when used year after year, without intervening dressings of lime, it took 20 years of continuous application before the effect was noticeable; such unusual treatment, it is claimed, would probably never occur in farm practice. In the tropics, the reverse is true, and sulphate of ammonia has been applied in numerous instances continuously year after year—notably in sugar-cane cultivation—without adequate dressings of lime. It should be emphasized that the maximum effect from sulphate of ammonia can only be obtained by applying lime or ground limestone periodically to soils on which this fertilizer is used with unfailing regularity.

Acidity and Deterioration of Cane Mill Juices.

W. L. MC. CLEERY (*Hawaiian Planters' Record*, 1925 Vol. 29 p. 59) has shown by analysing samples taken from the mill of the Hawaiian Sugar Company, that the increase in juice acidity, and the concomitant loss of sucrose at the milling station, are much larger than is usually supposed. It was noted that the increase in acidity from first to last mill was especially marked towards the end of a week's run. In consequence, a system of flushing and cleaning several times a day all spaces traversed by the juice, using hot water and lime, was inaugurated, with the immediate result that acidity was reduced and clarification improved. Furthermore, a total saving of sucrose of some 1·75 to 2·2 per cent. was effected, proving that prevention of bacterial action at the milling station is well worth the effort expended. Non-self-cleaning strainers are believed to be the main source of acid increase. Other potent sources are mill-beds, juice channels, mill-cheeks and receiving tanks. Perhaps the best method of dislodging accumulations, according to Mc. Cleery, is to flush the places with high pressure hot water three times a day, from a hose with small nozzle. A steam jet, although useful at short range, is not so effective in dislodging accumulations under the strainer screen. If the flushing is done often, only small amounts of water are needed, and little juice dilution occurs. Antiseptics are not recommended for the purpose.—*Facts about Sugar*, March 21, 1925, p. 274

BOOK REVIEWS.

THE RESOURCES OF THE EMPIRE SERIES. TEXTILE FIBRES AND YARNS.—By J. S. M. Ward, London: Ernest Benn, Ltd., 1924.

As Mr. Ward says in his introduction "the purpose of this volume is to set out in a concise and convenient form a summary of the position which Great Britain holds in the world's production of textile fibres." A survey is made of the fibres and yarns which are being produced in the Empire and the author shows to what extent in particular cases supplies could be increased. The book constitutes one of the volumes of the Resources of the Empire Series, which so far comprises twelve self-contained volumes dealing with the principal industries. Generally speaking the author has been fairly successful in his task, but it is of course impossible to guarantee scientific accuracy in that part of the work which is merely a compilation. For example, on page 90 an account is given of cotton in Malaya, in which the statement is made that the boll weevil was one of the pests encountered. The author has evidently confused the boll weevil with some other insect, for there is no record of the former being found in the East.

The summary of the position of cotton in the West Indies is not particularly good, and contains several statements which should not be passed over. The author says "the bulk of the cotton is grown by native labour, and it seems almost impossible to get the average negro to take adequate steps to maintain the purity of his seed or to carry out regulations laid down for the protection of the crops. We cannot hope for any great improvement in the quality of the crop or any increase in its output save by the use of white labour."

The above statement is based on misconception. The actual fact is that the Sea Island cotton industry of the West Indies is probably the most highly organised one in existence at the present day. Further improvement in the quality of the crop is probably unattainable, except in a few minor points, since all the varieties grown are in the highest degree of purity, and the rogues met with in the commercial cottons of other countries are absent from West Indian cotton fields.

In spite of a few errors of this kind the book will prove useful to textile students and to the business man who wants information on the available supplies of his raw material.

S. C. HARLAND.

THE TRINIDAD AND TOBAGO YEAR BOOK, 1925 Compiled and Published by C. B. Franklin, Trinidad. Price 2*s.* 6*d.*

A carefully compiled and very useful publication now in its 60th year. The new edition has been brought thoroughly up to date and contains, as usual, a brief review of the most important events which occurred during the year. A brief section is devoted to items of interest in Barbados.

"RUBBER, TEA AND CACAO." With Special Sections on Coffee, Spices and Tobacco. By W. A. Maclaren. With an introduction by H. Eric Miller, Vice-Chairman of the Rubber Growers' Association. London: Ernest Benn Limited, 8 Bouverie Street, E.C.4. Price 21s. net.

This book constitutes Vol. V in the series of 12 self-contained volumes in the Resources of the Empire. Each volume contains a foreword by H.R.H. the Prince of Wales and a general introduction by Sir Eric Geddes. The volume under review has, in addition, a special introduction by Sir Eric Miller, Vice-Chairman of the Rubber Growers' Association. In the Editor's foreword Mr. Maclaren states that the preparation of this volume occupied a period of less than four months and in view of this statement it must be conceded that he has accomplished a highly creditable piece of work. It must be deeply regretted that Mr. Maclaren had such inadequate time at his disposal for there are a number of obvious misprints which, under normal circumstances, should never have escaped the proof reader.

A special index to tables and diagrams is given at the end of the book and occupies 3¼ pages but the general index of barely 2½ pages is ridiculously inadequate. Appendix II contains a list, admittedly incomplete, of firms interested in the various commodities dealt with in the body of the book. Appendix II consists of a short bibliography which is hardly comprehensive enough and is weak in classification. It is to be regretted that adequate references are not given to the sources from which the book has been compiled. Many of these are obvious to those who are familiar with the literature of the subjects embraced but it would add considerably to the value of the book if these were clearly indicated.

The first section of the book occupying 98 pages is devoted to the raw rubber industry of the British Empire and includes a general economic and geographical survey of the various producing countries. In the first chapter the foundation and growth of the British rubber planting industry is traced throughout its various viscissitudes and successes up to the present rubber slump. The history of the scheme for the regulation of exports is described with a fair amount of detail, perhaps more than the purpose of the book would warrant. In the portion dealing with the marketing of rubber information is given, which, if not new, is nevertheless presented in a concise and handy form.

In the geographical survey the author traces the fascinating story of the development of the Empire rubber industry in the various countries and in this section he includes information as to costs of production, yields, labour, &c., which is not readily obtainable elsewhere. In the final survey of the rubber industry Mr. Maclaren touches briefly on the output of rubber from the Netherland East Indies.

The present reviewer is rather surprised that no mention is made of the introduction of the cord tyre. The author has pointed out that 70 per cent. of the planted rubber produced is utilised in manufacturing motor car tyres and has rightly emphasized that any check to the motor car industry necessarily implies a check to the rubber industry. The cord tyre, with a life considerably longer than the previous types, brought about a check to the amount of rubber used in the manufacture of motor car tyres which was by no means compensated for by the increase in demand brought about by the reduction in cost per tyre-mile. In the opinion of the reviewer this factor was an important subsidiary cause in bringing about the great depression in prices. No mention, either, is made of the potentialities of the reclaimed rubber industry which, though admittedly insignificant at the present time, may nevertheless constitute an important factor as the increased output of plantation rubber and the possibility of higher prices makes it profitable to produce and grade.

In general the author has given a very good general review of the industry with some important information hitherto difficult to obtain.

The second portion of the book occupying 105 pages deals briefly with tea, cacao and coffee, though, as the space allocated would indicate, the survey is far less complete than in the case of rubber. The section on tea is quite a good appreciation of recent developments. As with the other sections a brief general survey is given followed by a description of the industry in each country. The portion dealing with the marketing of tea is good and the statement regarding dividends of tea Companies are handled very well.

The highly interesting cacao industry of the Gold Coast is well described. The Gold Coast is now the largest exporter of cacao in the world and is probably unique in the sense that it is entirely a peasant industry. The deficiencies of the industry are well brought out and the question of the necessity of improved means of transport emphasized, since transportation constitutes one of the main items in the cost of production. It is evident that the average production of cacao per acre is ridiculously low and a warning is given against the dangers attending too great a degree of dependence upon one crop. The recent over-production of cacao at remunerative prices is mentioned but no suggestions are advanced as to lines of development to realise more remunerative prices.

In coffee the author points out that since the destruction of the Ceylon industry the production within the British Empire has been altogether overshadowed by the large production of Brazil, so that the exports from the Empire constitute only 2 per cent. of the world's total exportable surplus.

In the final survey of these crops it is pointed out that the present disproportionate costs of planting new tea areas tends to check increased

production but in spite of the competition of newly planted foreign areas the author believes that the British tea industry will remain in a very prosperous condition for some considerable time.

The strong competitive position of the Empire cacao industry does not prevent the author from pointing out the many weaknesses of the industry. The industry in Trinidad has been built up on a contract basis by which, the contractor, usually a native, receives a capital valuation, fixed more or less arbitrarily, when the trees come into bearing. This capitalisation sum is quoted as being fourpence per tree (p. 231). This is obviously erroneous and should read "four shillings per tree."

The book closes with a section of 60 odd pages on the spice and tobacco industries of the Empire. The literature on spices has hitherto been of a very scattered nature and in reducing this to a single section the author has performed a very valuable service. Tobacco does not readily lend itself to a general survey but the subject is handled in a very commendable way.

As a survey of a general nature the book is undoubtedly good and Mr. Maclaren deserves everyone's sympathy for having to produce the book in such a ridiculously inadequate time. Too much reliance has had to be placed upon other authorities but the few occasions on which the author's own critical faculty is exercised emphasizes the fact that under normal and reasonable circumstances he would have compiled a book really worthy of being considered as a standard book of reference.

The bulk of the book deals with crops which do not reach maturity for a number of years and in which the difficulties of adjusting supply to demand at remunerative price levels is rendered extremely difficult. The book is, therefore, interesting as illustrating the methods adopted and the degree of success achieved in bringing about this result.

C. Y. SHEPHARD.

"PRODUCTS OF THE EMPIRE." By J. Clinton Cunningham, B.A., Oxford : Clarendon Press, 1924. pp. 299.

Within the space of less than 300 pages Mr. Cunningham endeavours to survey the main products of the Empire both agricultural and mineral. It is, therefore, inevitable that the book should be of a rather superficial nature but as a reader for use in schools, a purpose for which it was obviously intended it has much to commend it, particularly as the text is copiously illustrated by photographs and sketches. The book is well written and contains a considerable amount of elementary but useful information, but the list of authorities and books of reference might with advantage be extended.

C. Y. SHEPHARD.

COLLEGE NEWS.

The Principal is expected back from England by the S.S. *Orange Nassau* arriving in Trinidad on or about the 6th June.

Dr. H. Tempany, Director of Agriculture, Mauritius, has kindly consented to act as honorary correspondent for *Tropical Agriculture.*

Mr. H. Wolfe, Deputy Director of Agriculture, Tanganyika Territory, has kindly consented to act as honorary correspondent for *Tropical Agriculture.*

The Model and Experimental Sugar Factory attached to the College completed its crushing season of 74 days on May 9th, 2,606,428 tons of cane being crushed and 250 tons of sugar obtained.

The Summer term began on Monday, April 20th, and ends on Friday, June 26th. Sessional examinations begin on Monday, June 15th. The Academic Year 1925-26 begins on Thursday, October 1st, 1925.

Enquiries concerning admission to the College, have been received from Fiji, Gold Coast, Canada, England, Barbados, British Guiana, Cuba, Dominica, Guadeloupe, Jamaica, St. Lucia and Trinidad.

Dr. J. C. Kielstra, Professor of Economics at the Agricultural College, Wageningen, Holland, called at the College on his return from Surinam and discussed various economic problems with members of the College Staff.

The College Syllabus for the Session of 1925-26 is now available and can be obtained, post free, on application to the Secretary, Imperial College of Tropical Agriculture 14, Trinity Square, London, E. C. 3 or to the Registrar, Imperial College of Tropical Agriculture, St. Augustine, Trinidad, B.W.I.

The Governing Body has authorised the Principal to arrange for a member of the College staff to visit the East, with a view to combating Panama disease, which has affected plants in so many parts of the world. At the instigation of the West India Committee this officer will also take the opportunity of studying limes, with a view to devising a method of meeting the Withertip disease.

Mr. E. A. Seagar has been appointed to the post of Lecturer in Tropical Sanitation and Hygiene established by the International Health Board, and will take up his duties at the College during the next Session. Dr. Seagar graduated at Edinburgh University and served during the war with the R.A.M.C. Later he became Assistant Medical Officer of Health for Bankok under the Siamese Government and has recently held the post of Neurological Specialist to the Ministry of Pensions in London. He is now following a special course at the London School of Hygiene and Tropical Medicine and will proceed to the John Hopkins University and to Andulusia (Alabama) before taking up his appointment at the College.

TREND OF THE MARKETS.

[*The notes below are based principally upon running charts of the prices of the basic grades and upon general statistical information gleaned from contemporary publications and cablegrams and are intended to be a record of movements. An attempt is made, where possible, to indicate the market outlook at the time of going to press, but no responsibility for the accuracy and subsequent truth of such observations is assumed. Unless otherwise stated the prices quoted are spot, London.*]

SUGAR.—Messrs. Lamborn, New York, quote Cubas and Porto Ricos at $2\frac{5}{8}$ cents per lb., cost and freight basis. The publication of Guma's increased estimate for the Cuba crop of 4,925,000 tons, compared with a previous forecast of 4,724,714 tons, caused a further set back and refiners in London were able to secure a cargo for prompt arrival at $2\frac{19}{32}$ cents cost and freight, New York, on April 23. The decision of the Imperial Parliament to increase the preference on Empire Sugar is expected to re-act favourably upon British sugar producing countries.

COTTON.—Up to the Easter holidays cotton showed a steady decline and touched 13·23*d.* per lb., Middling American, spot, Liverpool, on April 9. The continued rapidity with which cotton goes " out of sight " would appear to make any material decline unlikely. Since the holidays, while business developed little it showed a stronger tone and closed at 13·65*d.* on April 23.

RUBBER.—Rubber has shown a further substantial increase in price reaching $21\frac{1}{2}d.$ per lb. spot for Plantation Crepe, London, on April 15. This is significant in view of the additional exportable allowance of 10 per cent. to take place as from May 1, and indicates heavy consumption. Stocks on April 18, totalled 14,571 tons compared with 54,367 tons at the same time last year, and 72,000 tons recorded shortly after the war. Plantation Crepe again realised $21\frac{1}{2}d.$ on April 22.

RICE.—Stocks at Easter proved to be 25 per cent. below the total at the same period last year, and has helped to steady a declining market. Prices on April 22 were 36*s.* for Carolina and 15*s.* for Burmese, each per cwt.

COCOA.—Accras have shown a tendency to fall a little in price with the result that sales have increased. Closing prices on April 22, were :—Ceylon ordinary 105*s.*; Trinidad Mid. Red, 80*s.*; Grenada, Fine, 57*s.* 6*d.* and Accra Fermented, 35*s.*, each per cwt. spot, London.

COFFEE.—Brazilian coffee is somewhat cheaper but other kinds show a tendency to harden. Closing prices on April 15 were :—Costa Rica, Middling, 176*s.*; Mysore Middling 160*s.*; Kenya Good Middling, 146*s.*, each per cwt., spot, London.

TEA.—Growers have been urged to return to the system of fine plucking which should have a strengthening effect upon the market. Closing averages on April 22 were :—Ceylon 20·02*d.*; Indian, 17·31*d.*; Java, 12·81*d.*; each per lb., showing that the market has almost completely recovered from the temporary decline experienced during March.

SISAL AND HEMP.—Both Sisal and Hemp have receded a little in price. Prices on April 22 were £51 for Manila Hemp J, and £45 10*s.* for Prime Sisal.

COPRA.—Steady sales have been experienced. Prices on April 22 were :—Ceylon, £31 5*s.*; Straits to Rotterdam, £29 12*s.* 6*d.*, and Straits to Marseilles £28 17*s.* 6*d.*

OILCAKE.—Prices have suffered a slight decline but good inquiry exists. Linseed realised £12 10*s.*, Coconut £10 10*s.* and Cottonseed, £7 10*s.*, each per ton on April 22.

SPICES AND NUTMEGS.—Nutmegs are steady 80's being at 2*s.* and 110's at 1*s.* 10*d.* per lb. Mace realises 3*s.* 9*d.* to 4*s.* for good pale, and 3*s.* 9d. for fair pale. Very little enquiry and no business is reported for Jamaican Ginger.

THE WORLD'S RICE CROP.

THE International Institute of Agriculture, Rome, has recently received information enabling an estimate to be made of the areas under rice and the yield of Bulgaria, Spain, Italy, Portugal, United States, Ceylon, India, Indo-China, Japan, Korea, Formosa, Philippines, Siam, Java, Madura and Egypt, constituting approximately 98 per cent. of the world's total supply of rice, excluding China for which country statistics are not available. In these countries the average acreage under rice was practically the same (100·5 per cent.) as in 1923, differing but little from the average for the five-year period 1919-23 (99·3 per cent.) and showing an increase of 3·9 per cent. on the quinquennium 1914-18.

As the result of a generally favourable season the world's yield of rough rice in 1924 amounted to 1,807 million centals, exceeding by 7·5 per cent. the yield of the previous year, and greater by 2·1 per cent. and 4 per cent. respectively than the 1919-23 and 1914-18 averages. In 1924 the important exporting countries of India, Indo-China and Siam exported 148 million centals of rice. The aggregate yield in 1924 exceeded that of the previous year, so that there should be a tendency towards a greater export in the present year. In addition a number of the largest producers, including Japan, with Korea and Formosa, Ceylon, the Philippines, the Dutch East Indies and Egypt, which usually import considerable quantities of rice, have experienced a good year, so that the demand from these countries will, in all probability fall off, leaving an additional surplus for general export.

The production of the United States, unlike most of the other producing countries, was below the average of the past few years and a diminished export must be expected. It is noteworthy that the United States became an exporter as late as 1919, and this in spite of an increasing home consumption.